Hideaway Studio

AKAI S612 MIDI Front Panel Animator Module (FPA)

INSTALLATION INSTRUCTIONS (V1.1 Production Intent FPA Modules)

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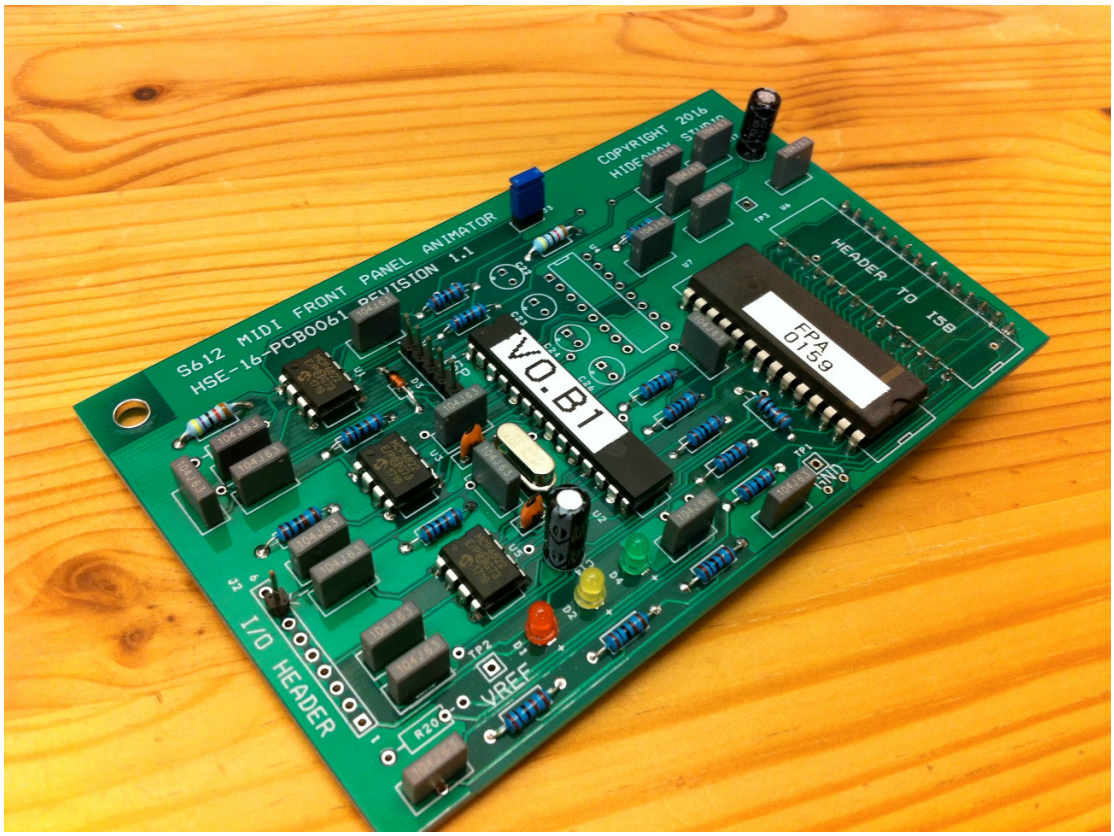


EXTREMELY IMPORTANT

The S612 must be unplugged from the mains before and during the installation process as there are a number of exposed subassemblies at mains potential posing a very real shock hazard.

Although the S612 FPA Module has been custom designed to neatly fit with as few wired interconnections as possible, the installation process requires experience in desoldering and recovering DIL ICs from PCB assemblies. A heated solder pump such as the Hakko 808 is highly recommended as the pads on the S612 main board are somewhat fragile. Insufficient experience in desoldering PTH components, or inappropriate tools, could easily result in permanent damage to the PCB.

If there is any doubt at all it is highly recommended the upgrade is fitted by an experienced service engineer.

Introduction

The venerable S612 sampler was designed by David Cockerell in the early 1980s as one of the first "affordable" samplers on the market. Completely crushed in terms of specification by today's standards, with its one second sample memory in max sample rate and ultra basic midi implementation, the S612 still has a following. This is in part because it is very simple and direct to use with a 5 octave transposition range. It also has a remarkably accessible user interface featuring manual sample splicing control permitting the start and end points to be moved and even reversed in real time on dedicated controls.

This feature is very effective but what it has always lacked is some means of animating the controls in real time. The FPA Module allows just this - under the control of 5 MIDI CC channels its possible to control the Sample Start, End, Decay/Release, Filter Cutoff and Vibrato Controls from a sequencer all in warm scratchy 12-bit audio with surprisingly fast midi response.

This opens all sorts of weird glitchy loops, reversed effects, morphing/traversing effects and general chaos as well as a whole raft of interesting traversing effects whilst rhythmically walking through sampled evolving morphs and arpeggios...

Installation Overview

Please note this installation procedure covers V1.1 production intent FPA Modules (serial number 0101 onwards).

The installation of the S612 FPA Module requires the removal of a large motherboard from the S612's chassis to gain access to the underside. This permits the desoldering and careful recovery of a 28-pin DIL chip (NB: this IC is supplied fitted to pre-tested modules) and its replacement with two 14-pin SIL headers. Unfortunately there are a number of subassemblies that sufficiently overhang the edges of the motherboard preventing it from being removed without further disassembly. This includes the complete front panel subassembly.

Due to the significant number of ageing tightly fitting crimped cable harnesses that terminate on the various subassemblies a somewhat unusual approach of undertaking the retrofit whilst leaving many cables in position has been devised. This also prevents accidental swapping of a number of cables terminated in the same type of connectors. This slightly unorthodox process involves gently rolling the Motherboard and Front Panel sub-chassis together onto a soft surface such as an old towel to gain access to the underside of the motherboard for header fitment.

Typical installation time is in the order of 1.5 hours but naturally first experience of the process may require a little longer.

Once the SIL receptacle headers have been fitted and the motherboard refitted the FPA module itself neatly plugs into the new headers and firmly picks up on a mounting point to the chassis on a metal standoff holding it firmly in place. Only 1 jumper wire is required to be soldered in place.

Test your S612 *before* installing the FPA Module!…

Tip: If you have just received the instrument, or it has been in storage for an extended period, it is essential the unit is tested to ensure 100% functionality prior to undertaking the retrofit. This includes the PSU assembly which is a known weak point and source of common failures in the S612. S612 PSU pcb overhaul and testing is covered in a separate document.

Kit Contents

1	off	V1.1 FPA Module (V0.B1 Firmware)
1	off	30cm long jumper wire with single pin receptacle
1	off	Hexagonal M3 metal standoff
1	off	Red M3 fibre washer
10	off	Cable ties
2	off	14 way SIL receptacle headers
1	off	11K resistor (used to centre Tuning pot)

Installation Process

Tip: A lot of screws are removed during the process so a pot or dish to keep them is useful.

1. Removing the Top Lid

- Place the S612 on a well lit flat surface with a good amount of space around the unit. Remove the two large Pozidrive screws on each side of the top lid and the small black screw on the top lip of the rear of the cover.
- Gently slide the top cover towards the rear of the S612. Whilst gently splaying the lower flanks of the cover away from the edges of the unit remove the lid and place it somewhere safe.

2. Removing the Extruded Aluminium Front Panel

The extruded aluminium front panel cover must be removed to gain access to the screws that hold the front panel subassembly to the main chassis.

- Turn the S612 upside down and remove the three machine screws along the bottom edge of the front panel extrusion. Turn the unit back over and remove the three machine screws along the top edge.
- NB: There is no need to remove the front panel control knobs.
- Gently pull the front panel extrusion by the rack ears towards your chest sliding it over the front panel controls. Recover the three U-shaped metal packing washers along the top edge.

Tip: At this point you might want to take the opportunity to gently remove any dust and debris under the cover and around the front panel controls and display with a soft paintbrush. Also make sure all potentiometer retaining nuts are gently tightened as they have a tendency to become loose over time which puts stress on the solder joints.

3. Loosening off the motherboard PCB Subassembly

Prior to removing other surrounding obstacles the motherboard mounting screws must be removed.

- Remove the two long screws securing the Disk Drive Expansion socket to the chassis.
- Remove the two screws securing the MIDI socket pcb assembly to its mounting bracket.
- Swing the MIDI socket board up and out of its mounting bracket.
- Remove the remaining 6 shorter machine screws securing the motherboard including the one in the centre.
- Do not attempt to remove the pcb at this stage. Gently attempt to slide the board a few mm in each direction to confirm that all of the mounting screws have been removed.

4. Disconnecting the wiring to the PSU Board Subassembly

- Carefully unplug all connectors to the PSU taking note of their original positions.
- Please note that the larger connectors from the transformer and the two pin red/black 5V logic power connectors have small locking levers than need to be depressed before unplugging the connector to release them.

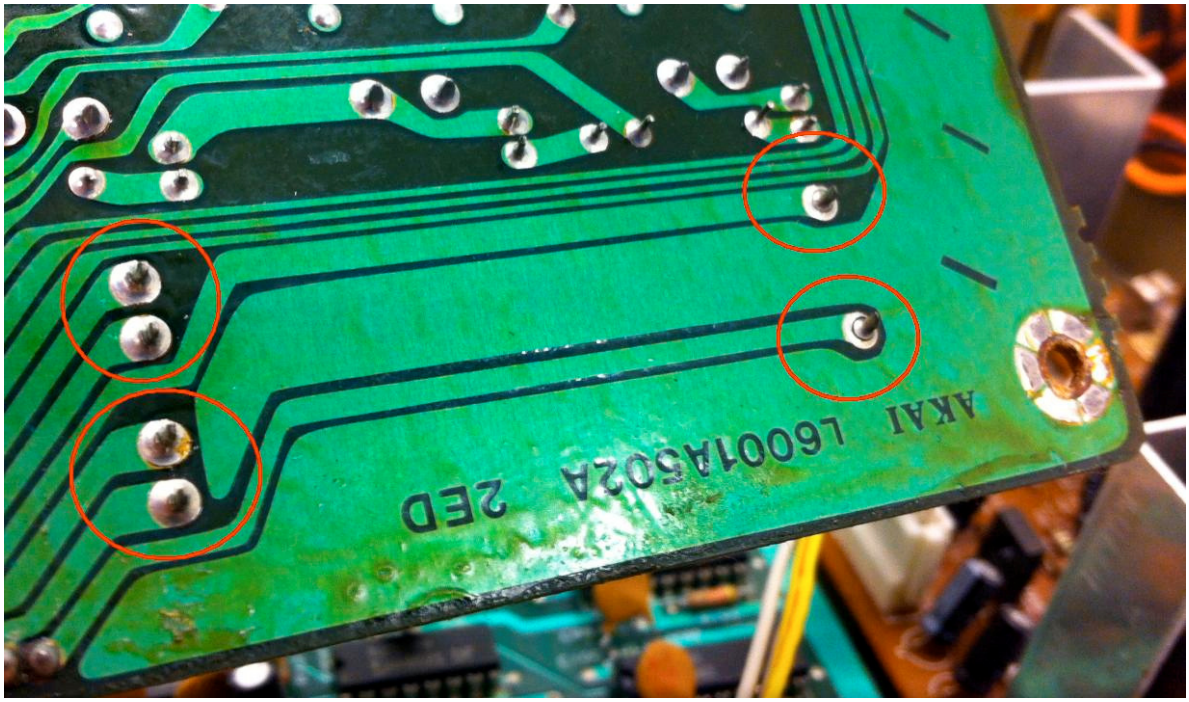
5. Loosening off the Front Panel Slider PCB Subassembly

- Remove the 5 threaded brass hexagonal spacers with an M3 bolt driver or socket.

6. Loosening off the metal Front Panel Sub-Chassis

- Gently swing the lower edge of the Front Panel Slider PCB away from the metal sub-chassis to reveal a machine screw in the middle towards the bottom edge and unscrew it.
- Remove the two screws on the corresponding left and right bottom edges taking note that one screw also secures a solder lug.
- Remove the two screws in the top and bottom of each side securing the front panel subassembly to the main chassis.
- Extract the long black plastic Power Switch actuator rod from the front panel.

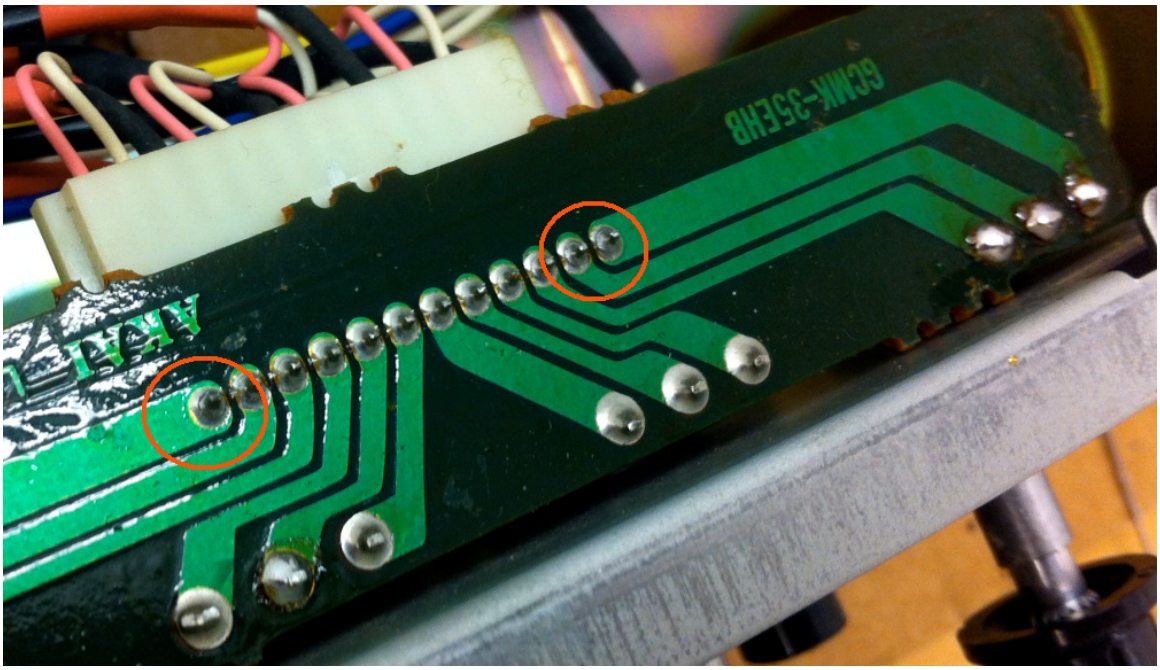
TIP: Check under the two front panel sliders for dry joints as they are very common here (circled in red in the image below)



7. Removal of the Front Panel Assembly and Motherboard

- *NB: Do not disconnect any of the connectors to the front panel sub-chassis assembly as the complete assembly will be moved as one throughout the remainder of the installation.*

TIP: Check all solder joints on the front panel pots and sockets as they are very common.



7. Removal of the Front Panel Assembly and Motherboard (Continued)

- Gently pull the loosened front panel sub-chassis assembly away from the main chassis by a couple of cm to ensure all of the screws have been removed.
- Place an old towel or wad of newspaper over the rear panel and to the rear of the S612 to act as a soft landing for the Motherboard and Front Panel assemblies when they are turned upside down.
- Gently slide your hand under the Motherboard which should be free from the chassis.
- Having ensured the motherboard is free to move hold it under one hand and very carefully roll the Motherboard and complete Front Panel sub-chassis from front to rear so that the motherboard and front panel sub-chassis are resting upside down on the towel over the rear panel of the S612. Care should be taken not to allow it to land on or become damaged by surrounding metalwork.
- Ensure the motherboard is not being excessively warped whilst in the inverted position or that any of the internal wiring assemblies or connectors are under strain.

IMPORTANT: Checking the Motherboard PCB Support Insulators Are Fitted

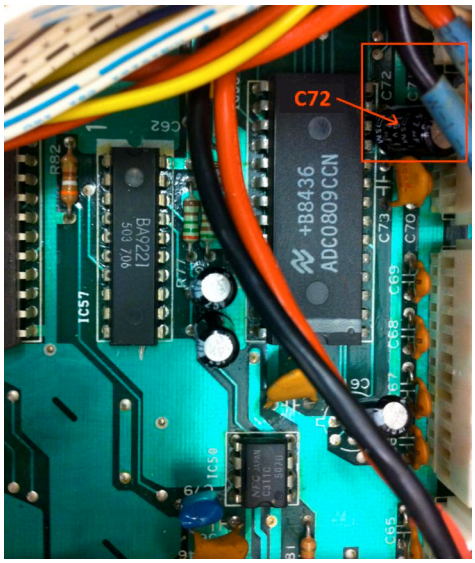
During production AKAI issued a Field Change to overcome a potential short circuit scenario forming between an outer area of the main 5 volt rail pcb track on the underside of the S612 motherboard and the metal chassis underneath the mounting holes for the MD280 Disk Drive port connector.

On most later models there should be two white/clear plastic washers present sandwiched between the underside of the pcb and the top of the metal connector mounting points. These washers are often held in place to the underside of the pcb or to the metal supports with glue. It is very important these washers are not lost during FPA installation and that they are still present on reassembly.

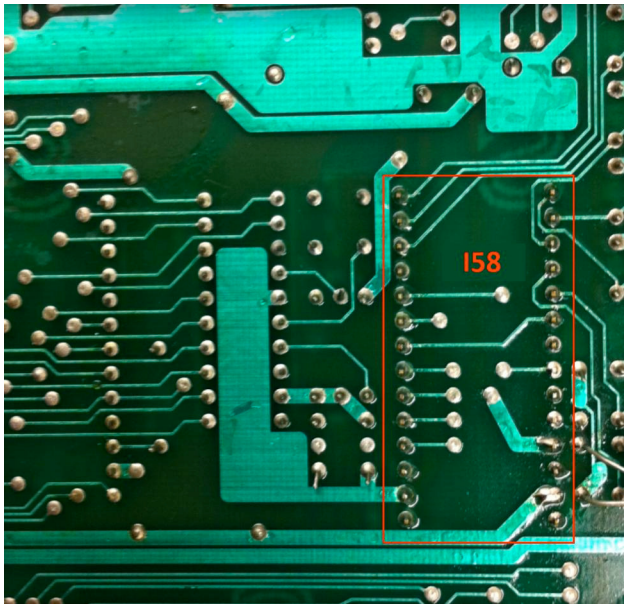
It has been noted that the insulating washers are not present on some early units and it is very important this is addressed to prevent possible damage to PSU. The lack of insulating washers can be simply remedied by cutting a small piece of acetate sheet (eg. overhead projector film) to cover and straddle the two metal supports or using 2 off M3 fibre washers or plastic washers. A screwdriver or soldering iron can be used to pierce holes in the film to allow the mounting screws to pass through and secure it.

8. Desoldering I58

- The FPA Module fits on a pair of headers in place of IC I58 which is located at the front left hand side of the motherboard. Prior to removal of the IC a small electrolytic capacitor (C72) must be removed and relocated as it is in the way of the headers.



- Locate the solder pads to the capacitor (C72) on the underside of the motherboard as shown in the image and desolder and recover the part.



- Locate the 28 solder pads as seen in the image above for I58 on the underside of the board. Flow fresh solder into each of the joints – this will help the desoldering process.

- It is highly Preferable to use a heated solder pump such as the Hakko 808 or Anesty ZD-915 to remove the solder from each of the 28 solder pads being very careful not to overheat or damage the pads as they are quite thin and delicate.

- When the pads are clear of solder, very gently pry a blunt screwdriver under the chip to determine whether the part is loose. Be especially careful not to damage the fine pcb tracks that run underneath the chip. Do not force the part remembering that it must be recovered in tact for reuse in instances where the part is not pre-fitted to the FPA module.

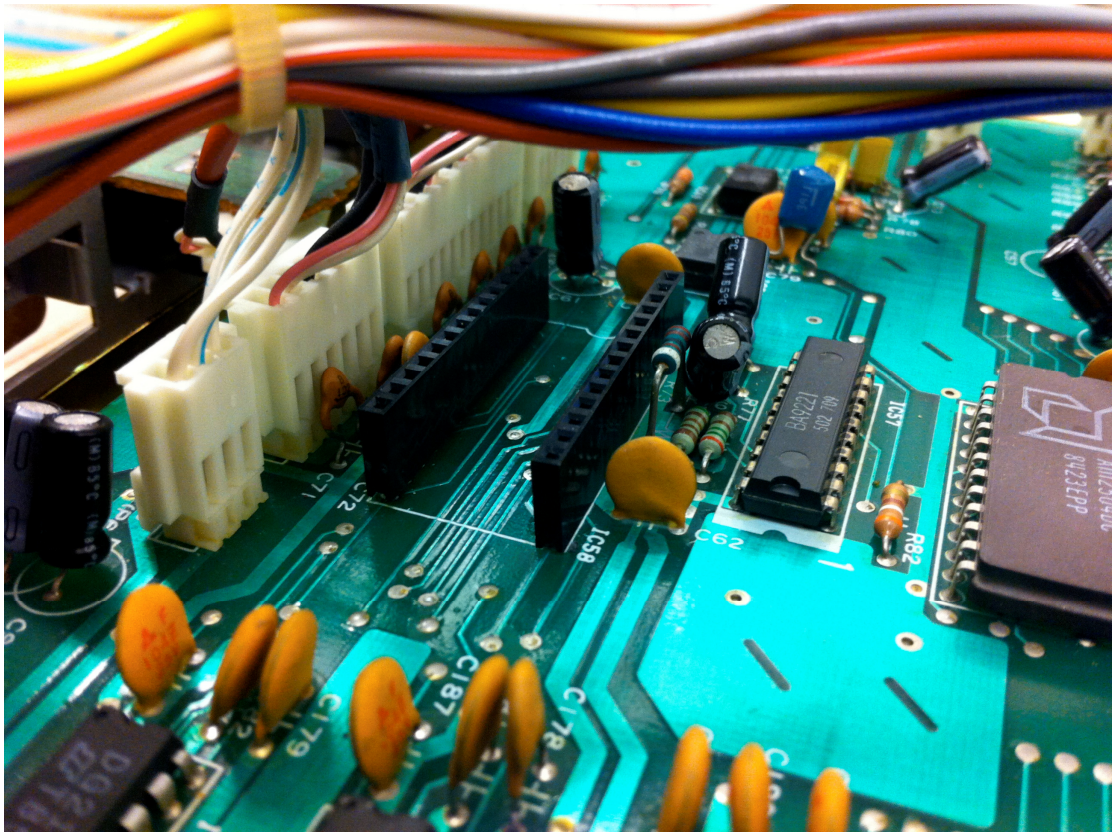
Tip: If a pad is proving difficult to clear try reflowing it with fresh solder and repeating the desoldering process.

- Once the part is fully desoldered, very gently pry it out of the motherboard and check that the legs are straight and free of solder.
- Observing basic anti-static precautions, place the IC in a safe place for use later.

Tip: If I58 is damaged during removal, the part (ADC0809CCN) is still in manufacture and can be obtained from most major parts suppliers such as Farnell/Element 14.

9. Fitting the FPA Module Header Receptacles

- Before the two FPA Module header receptacles can be fitted to the top surface of the S612 motherboard it is essential that the pads (I58) are completely clear.
- When the pads are clear each header should fit in position without excessive force and sit parallel and perpendicular to the surface with the body resting on the top of the pcb.
- Do not apply excessive force to the headers as the pin receptacles may otherwise become dislodged within the connector body or the pcb plate-thrus may be damaged.

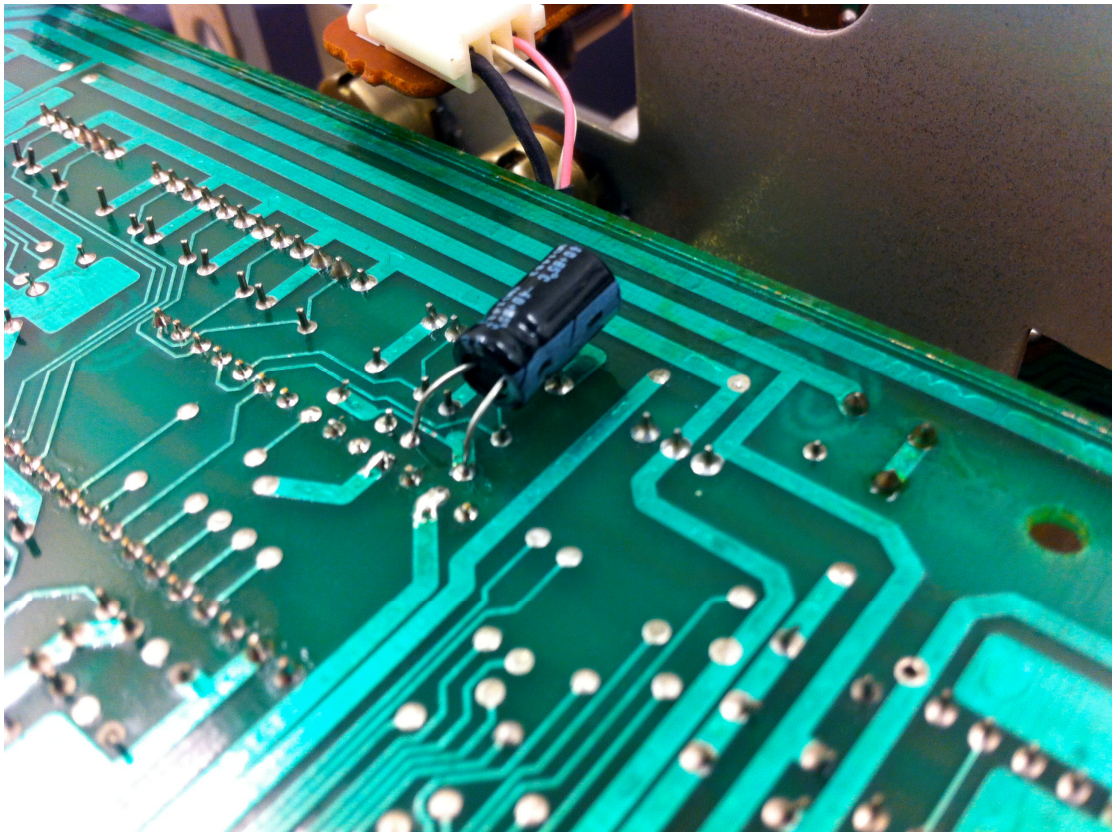


- Once correctly positioned solder each header in place ensuring they stay flush and perpendicular to the pcb surface located during soldering.

10. Relocating and Fitting Capacitor C72

The previously recovered electrolytic capacitor must be positioned on the underside of the motherboard paying careful attention to the polarity.

- Clear the pads of solder.
- Place the two legs in the pads ensuring the negative pin is facing the centre of the pcb and position the capacitor on its side as in the image.



- Check all of the solder joints on the headers and capacitor.

Tip: It is not essential but any excessive solder flux may be removed with pcb cleaner or neat isopropyl alcohol using an old toothbrush.

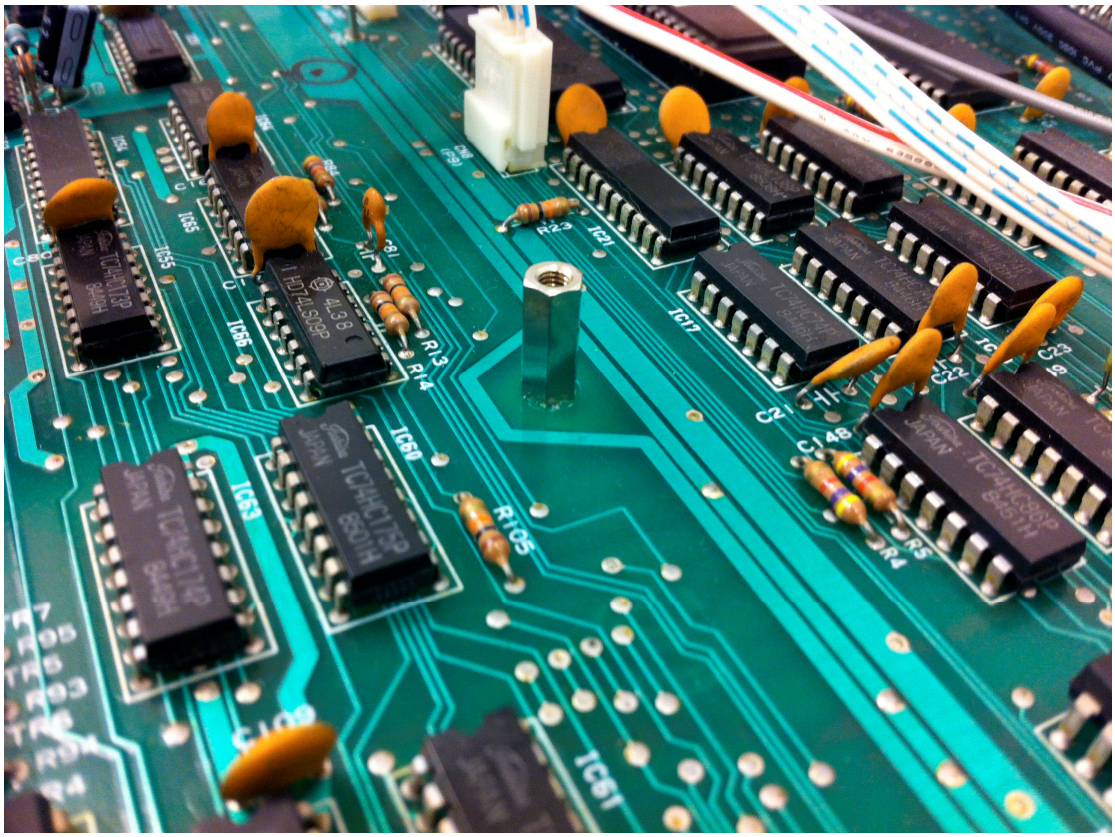
11. Replacing the Motherboard

Tip: All pcb retaining screws except the two longer Disk Drive Expansion connector screws are domed M3 machine screws and not the self tappers used elsewhere on the S612.

Having fitted the two headers and relocated the capacitor the motherboard may be refitted.

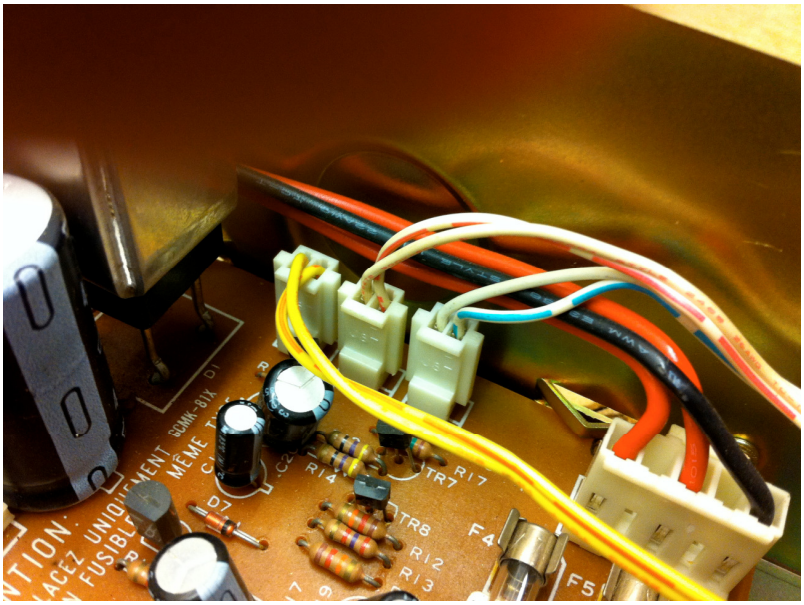
- Being very careful not to excessively warp, knock or scrape the motherboard, gently roll the subassembly upright from rear to front.
- Gently slide the motherboard into position on the chassis aligning the mounting holes in the pcb with the chassis mountings making sure no cables are trapped under it.
- Losely fit the two longer screws on the Disk Drive Expansion connector.
- Losely fit one of the mounting screws along the front edge of the pcb.
- Having ensured the pcb is flat and aligned then fit all of the remaining motherboard screws EXCEPT the single screw in the centre of the pcb and tighten. Ensure all screws are tightened but do not excessively tighten them as this may crack the pcb.

- Fit the 12mm metal hexagonal M-F standoff from the kit of parts in place of the centre pcb mounting screw on the motherboard using an M3 boltdriver or socket.



12. Reconnecting the PSU Cables

- Ensure no wires are trapped under the pcb or heatsink bracket.
- Refit the connectors paying attention to the correct position of the three 2-way connectors on the right hand side of the pcb. The colour codes should be as follows in the picture below.



13. Refitting the Front Panel Subassembly

Tip: Prior to fitment this is a good opportunity to squirt a little DeoxIT F5 into the sliders and inside the front panel pots. Do NOT use contact cleaner, WD40 or Isopropyl Alcohol!!

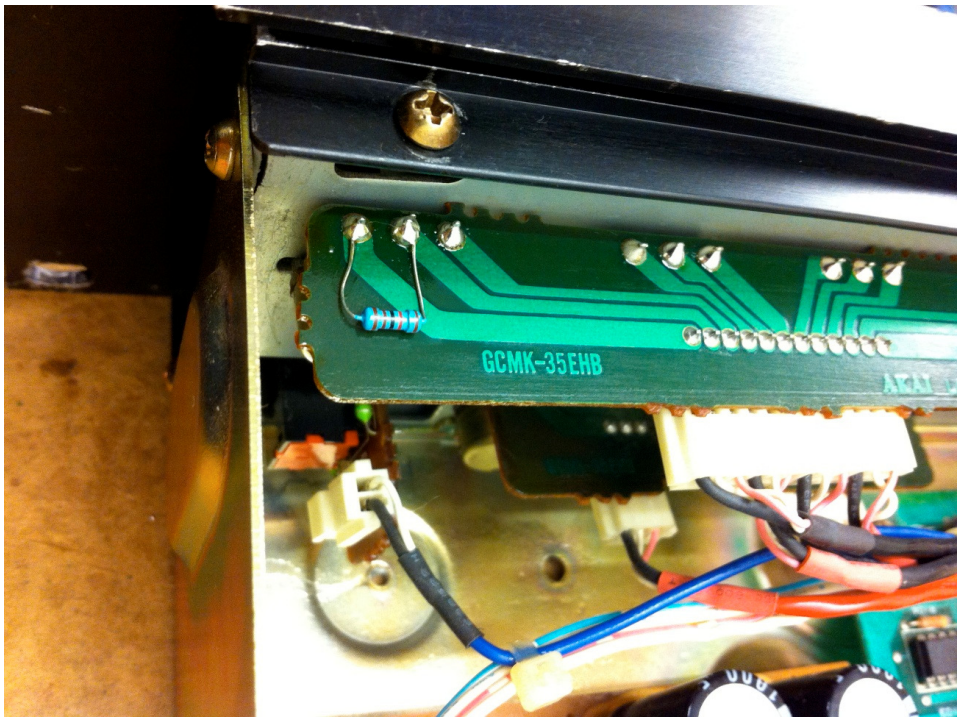
- Ensuring no wiring is trapped between the chassis and the front panel, reposition the front panel subassembly between the chassis uprights and refit the three screws along the bottom edge making sure the solder lug is under the right hand screw.
- Don't forget to fit the screw under the front panel pcb in the centre of the front panel subassembly.
- Refit the upper and lower screws on each side of the front panel assembly.
- Refit the Front Panel Slider PCB using the 5 threaded brass hexagonal spacers.
- At this stage, do not fit the extruded aluminium front panel cover.

14. Fitting the Tuning Trim Resistor

Since the source of the reference voltage for the front panel controls is different in units with FPA modules fitted the Tuning Control must be slightly re-calibrated to compensate.

Prior to refitting the aluminium front cover the 11K resistor supplied in the installation kit must be fitted on the pcb to the rear of the Tuning Control.

- Looking from the front of the unit some S612s have a single resistor soldered between the left and centre pads of the rear of the Tuning Control. Desolder this resistor if present.
- Solder the resistor onto the middle and right hand pads of the Tuning Control as shown in the image.

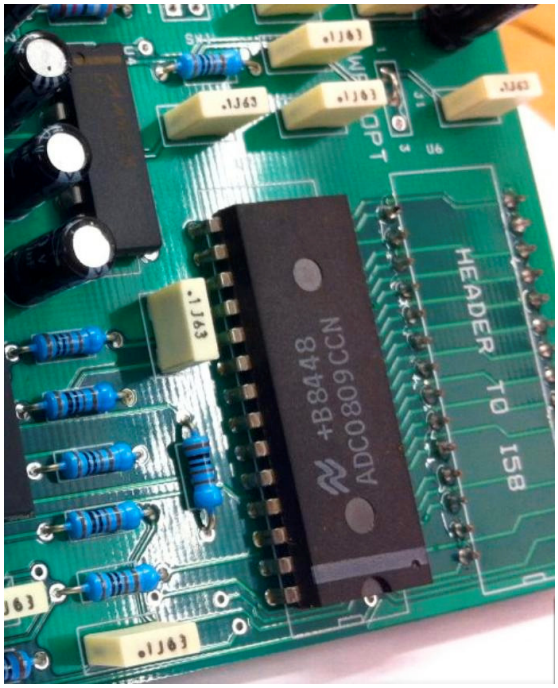


15. Replacement of I58 on FPA Module

The ADC0809 chip recovered from the I58 position on the motherboard is relocated on the FPA Module in position U7.

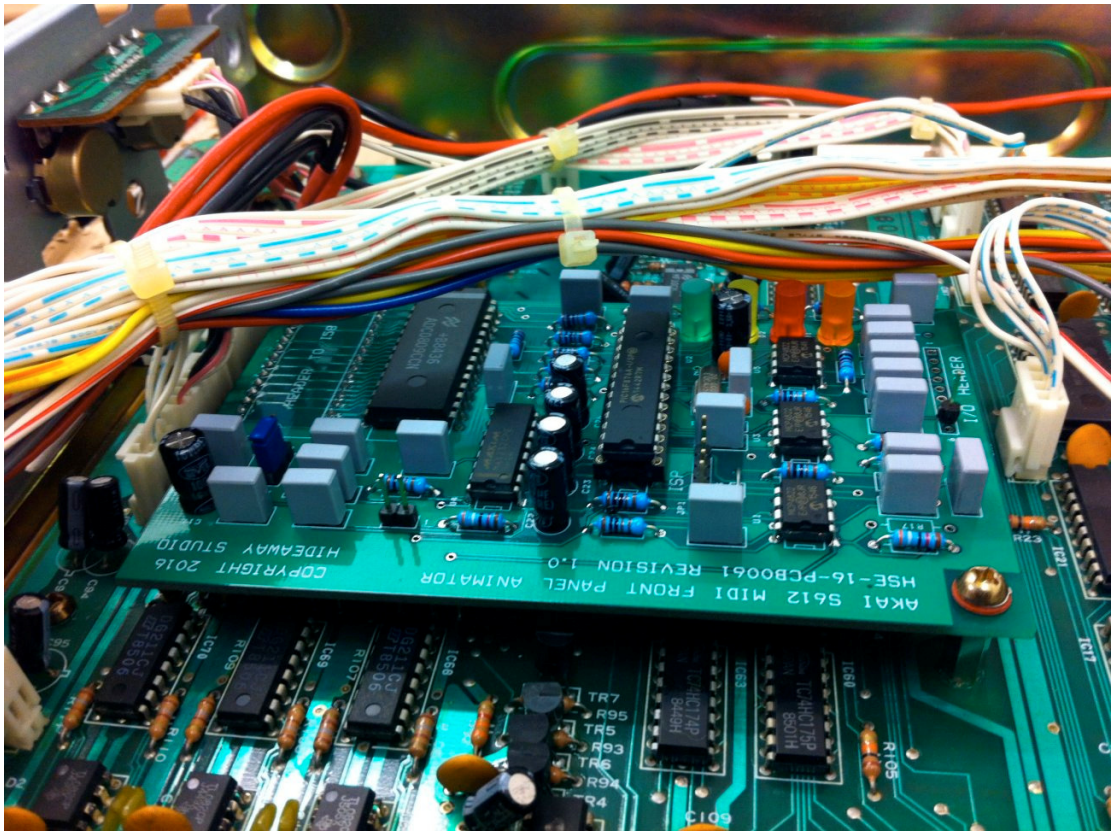
NB: This IC is already fitted on pre-tested FPA Modules.

- Ensure the chip is located correctly with pin 1 (slotted ident on the chip) aligning with the square pad in the U7 position of the FPA module pcb and solder in place.



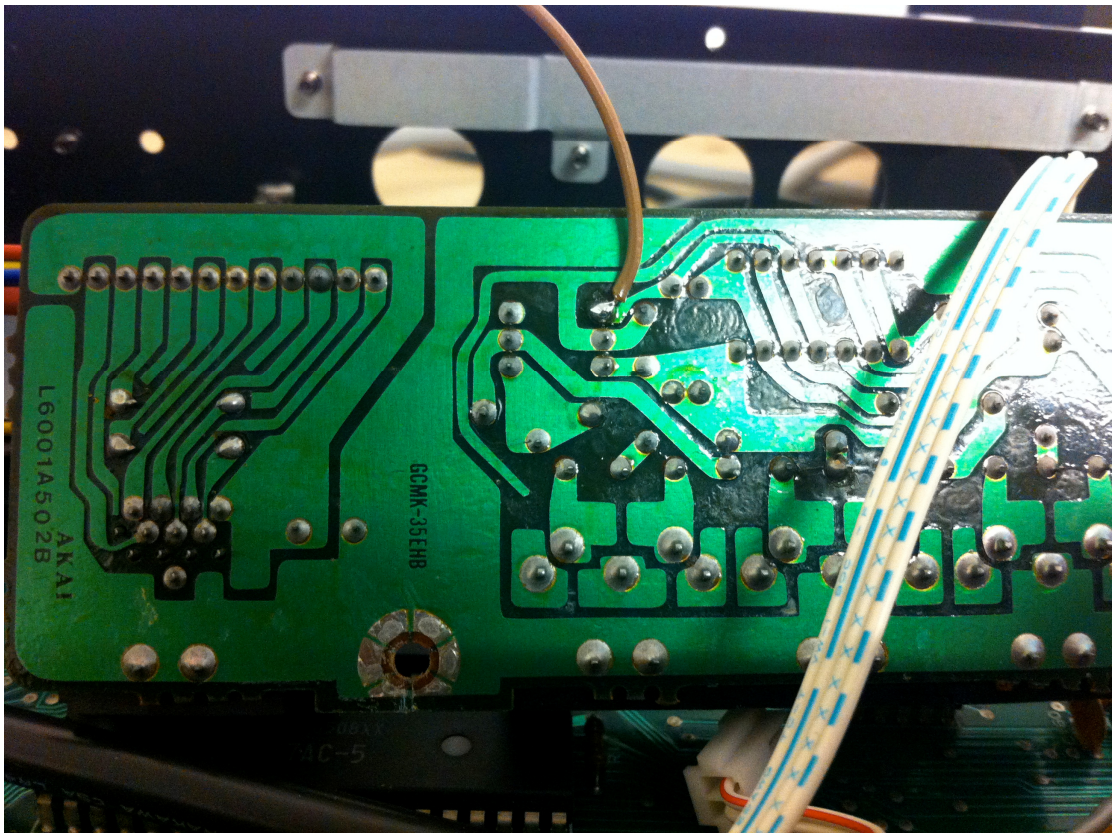
15. Fitment of the FPA Module

- Carefully locate the 28-pins of the FPA module over the two SIL receptacles on the motherboard ensuring all pins align correctly before pushing the module into position.
- The far edge of PFA module should align with the 12mm standoff positioned in the centre of the motherboard.
- Secure the FPA module with the remaining domed M3 motherboard retaining screw including the red fibre washer in the kit of parts sandwiched between the screw head and the top of the FPA pcb.



16. Fitting the MIDI Data Input Lead

- The module requires just one flying lead to be fitted. This lead carries the MIDI data from the opto-isolator circuit on the MIDI input pcb to the FPA board.
- Remove the MIDI socket pcb assembly by removing the two brass coloured domed M3 screws on the pcb. The black screws on the rear panel do not need to be removed.
- Gently swing the front edge of the MIDI socket pcb upward and remove from the rear panel.
- Solder the end of the jumper wire in the kit of parts to the solder pad shown in the following image.



- Refit the MIDI socket pcb, making sure the top of the connectors correctly locate under the metal strengthening bracket and secure the pcb with two self tapping screws.
- Plug the other end of the brown jumper lead into the single I/O pin on the FPA Module.
- Secure the lead in place with a couple of cable ties to the wiring harness as shown.

17. Refitting the Extruded Aluminium Front Panel

- Turn the unit over, gently position the front panel cover over the controls and secure in place with the three screws in the bottom of the cover.
- Turn the unit back upright and insert the black power actuation rod.
- Locate the three U-shaped metal packing shims.
- Fit the top three securing screws in the top of the panel cover but do not tighten.
- Slide the packing shims in place between the underside of the front panel top flange and the top of the front panel assembly located over the shank of the screws.

18. Final Inspection Before Final Testing

Carefully visually inspect all subassemblies to ensure all cable harnesses and connectors assemblies are in tact and in place. Ensure no loose screws, metal objects or tools have been left inside the unit.

19. Final Test Procedure

- Before applying power set the front panel controls to the following positions:

- Filter control ***must*** be in the fully clockwise position (signals Manual Mode on power up)

- Start slider fully left & End slider fully right
- LFO Speed, Depth & Delay controls fully anti-clockwise
- Decay control fully anticlockwise & Level control fully clockwise
- Monitor & Rec Level controls in mid position

- Connect a MIDI controller to the MIDI input socket on the rear of the S612 able to produce both Note On and CC controller events (eg. Arturia BeatStep™). Setup the controller mapping 7-bit non-relative continuous controllers to MIDI CC numbers 20 thru 24 on MIDI Channel 1.
- Ensuring none of the live internal assemblies are touched, carefully apply power to the unit. A flashing RED heartbeat LED on the FPA Module should be observed.

If any fuses blow or the front panel LEDs do not illuminate as normal switch off immediately, disconnect the mains power and check for lose connections and shorts.

- Check that the green LED on the FPA Module is not illuminated.
- Apply an audio signal to the Line Input and press the NEW button *(TIP: a square wave that rapidly falls in pitch over the duration of the sample is very useful for testing the sample start/end slider animation controls).*
- Attempt to play the sample with Note_ON events from the controller whilst moving the FILTER Control on the front panel.

If notes sound but the filter control doesn't appear to work then power off the unit immediately

- If the filter control appears to work then check the following controls work as expected:

- Sample Start Slider
- Sample End Slider
- LFO Speed, Depth & Delay Controls

If all of the above controls work then all of the ADC and DAC channels on the FPU are ok.

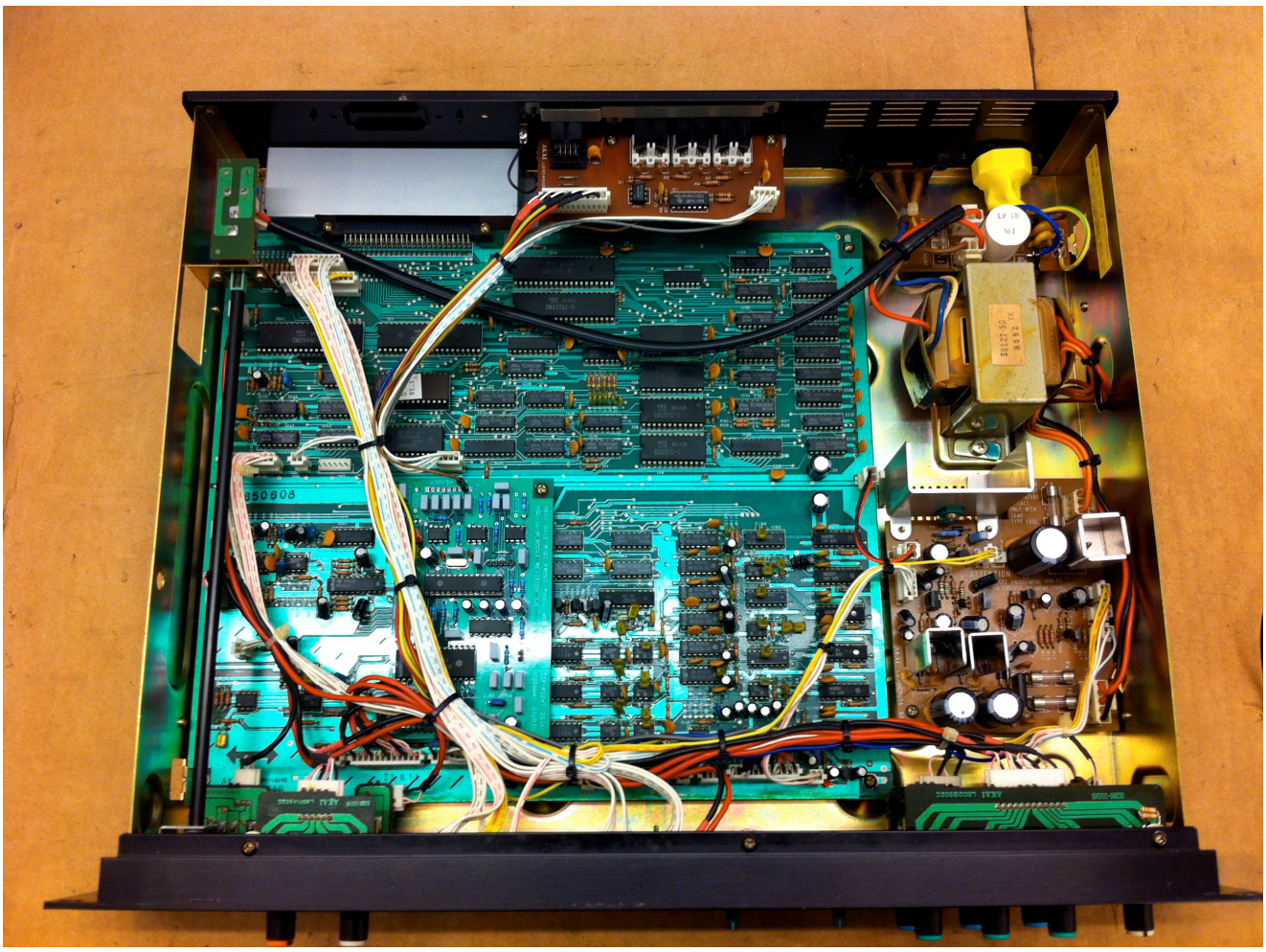
- Power the unit down.
- Turn the Filter Control fully anti-clockwise and power the unit back on (Animated Mode)
- Check that the green LED on the FPA Module is now illuminated.
- Apply an audio signal to the Line Input and press the [NEW] button.
- Whilst playing the sample with Note_ON events from the controller turn the controller corresponding to MIDI CC channel 24 and confirm that the filter cutoff is responding.

If the filter cutoff frequency is changing then the FPU module is correctly decoding midi.

Press the [ONE SHOT] button and Confirm:

- MIDI **CC 20** controls the Sample **START** position
- MIDI **CC 21** controls the Sample **END** position
- MIDI **CC 22** controls the **LFO SPEED** (LFO depth is controlled by modulation wheel)
- MIDI **CC 23** controls the Sample **Decay**/**Release** Rate
- MIDI **CC 24** controls the **FILTER CUTOFF**

If all CC channels are operational then refit the top lid using the 4 large Pozi screws and the small black self tapper on the rear top edge. Affix the FPA Serial Number label to the rear panel.



S612 FPA Module In Position

D.A.Wilson, June 2019